NOTES FOR STUDENTS.

CARDOT has described[1] five new species of Fontinalis from North America: *F. patula* (§ TROPIDOPHYLLÆ), from Vancouver near Victoria, collected by Macoun; *F. Missourica* (§ HETEROPHYLLÆ), from Benton county, Missouri, collected by Demetrio; *F. Dalecarlica Macounii* (§ LEPIDOPHYLLÆ), from Athabasca Lake, collected by Macoun; *F. Waghornei*, from Trinity Bay, New Harbor, and Witter's Bay, Newfoundland, collected by Waghorne; *F. MacMillani* (§ MALACOPHYLLÆ), from northern Minnesota, collected by MacMillan.—C. R. B.

STUDENTS of forest distribution will be interested in Professor T. H. MacBride's discussion of forest distribution in Iowa.[2] He shows that all the students of the forest problems in his state have been right, but only partially so. His own conclusions, which combine views which seemed to be in conflict, are as follows: (1) the immediate agent in the limitation and distribution of Iowa forests was fire; (2) the sweep of fire was determined by a modicum of moisture and by the presence of fuel upon the ground; (3) the drift being especially adapted to gramineous vegetation furnished fuel in such amount as to prevent the development of tree seedlings, while the loess, using the term in a broad sense, less suited to gramineous species, furnished less fuel, hence gave to tree seedlings on loess regions opportunity to rise; (4) special localities, as swamps, alluvial flood-plains, etc., present special cases and require special explanations.

THE FOLLOWING items are of taxonomic interest: Dr. John K. Small[3] has prepared a synopsis of the North American species of Ilysanthes, recognizing six species, one of which is new. Mr. Eugene P. Bicknell[4] recognizes two species in the well known Scrophularia of the eastern states, the segregated one being called *S. leporella*. Mr. H. N. Ridley[5] has described a new genus of Commelinaceæ from the Malay Peninsula, under the name Spatholirion. M. A. Franchet has described eight new species of Saxifraga[6] and ten new species of Sedum[7] from China, and proposes a new section[8] (Xyphosandra) of Parnassia, in which the very acuminate connective is produced far beyond the loculi, giving to the anther the appearance of a dagger. Miss Alice Eastwood[9] has described ten new species from southeastern Utah. Mr. J. G. Baker[10] has published an illustrated synopsis of the genus Brodiæa, as

[1] Revue Bryologique — : 67. 1896.
[2] Reprint from Proc. Iowa Acad. Sci. **3**: 96–101. 1895.
[3] Bull. Torr. Bot. Club **23**: 296. 1896.
[4] *Ibid.* **23**: 314. 1896.
[5] Jour. Bot. **34**: 329. 1896.
[6] Jour. de Botanique **10**: 261. 1896.
[7] *Ibid.* **10**: 284. 1896.
[8] *Ibid.* **10**: 267. 1896.
[9] Proc. Calif. Acad. Sci. II. **6**: 270. 1896.
[10] Gard. Chron. **20**: 213 and 238. 1896.

defined in Bentham and Hooker's *Genera Plantarum*. American plants recently figured, and with full descriptive text, are *Clematis Addisonii*,[11] *Lonicera hirsuta*,[12] *L. hirsuta* × *Sullivantii*,[12] *Aquilegia Jonesii*,[13] *Rhododendron Vaseyi*.[14]

DR. B. L. ROBINSON, in a recent discussion[15] of the fruit of Tropidocarpum, calls attention to its great variability, and its consequent uselessness for taxonomic purposes, a fact which militates strongly against certain proposed species. Aside from the taxonomic features of the discussion the fact of greatest general interest is the occurrence of the internal capsule which frequently appears in what is known as the *capparideum* type of capsule. This internal capsule is variable in size, "from the merest obscure rudiment to a capsule half the length of the outer one." The outer capsule is always 3 or 4-valved, and the inner one always 2-valved, and when well developed contains two seeds, "which mature in just the same way as those in the surrounding capsule." The embryo also is apparently perfect, and the capsule regularly dehisces. As Dr. Robinson suggests, the fertilization of these innermost ovules is a very interesting problem. If they are reached by pollen tubes, these tubes must penetrate two styles. The inner capsules are usually axial in position, but sometimes arise near the base of the outer capsule. The author suggests that these inner capsules "represent a second whorl of carpellary leaves." Similar internal capsules have been noted by Peyritsch in *Draba alpina*.— J. M. C.

HUGO DE VRIES[16] has convinced himself by a long series of cultures that a large part of the teratological anomalies in plants are in their nature hereditary. His already known observations on the hereditary nature of fasciation and torsion are now followed by a discussion of adhesions and cohesions, or symphyses.

Having transplanted from a wheat field to his garden some individuals of *Hypochæris glabra* showing adhesions, he found the second generation with about 9 per cent. of similar adhesions, and the seventh with 64 per cent. A similar selection of *Helianthus annuus* with united cotyledons produced in the third generation plants showing 76, 81, and 89 per cent. of syncotylous embryos.

To these De Vries adds a host of similar facts from cultures and many observations of the repetition of teratological variations upon shrubs and trees. All, he thinks, point to the hereditary nature of the phenomena.

This heredity, he adds, sometimes appears "lateral," *i. e.*, it shows itself

[11] Gard. and For. **9**: 324. 1896.

[12] Gard. and For. **9**: 344. 1896.

[13] Gard. and For. **9**: 365. 1896.

[14] Gard. Chron. **20**: 71. 1896.

[15] Erythea **4**: 109. 1896.

[16] Botanisch Jaarboek **7**: 129–197. 1895.

in lateral branches of the genealogical tree, as in clover. It is hard, too, to get rid of it. The adhesions may skip an entire generation in annuals and reappear in the next, just as in perennials they may skip a year. The manifestation of the property depends to a high degree upon external conditions.

All the facts show that the heredity of adhesions is ordinarily latent, manifesting itself only occasionally.

The fact of heredity obliges us to suppose for the symphyses material carriers (pangens) in the protoplasts. But neither the number nor the influence of these appear to be ordinarily great enough to assure more than an occasional appearance of the anomalies. A concurrence of very favorable conditions seems always to be necessary to their manifestation, at least unless they have been fixed and accumulated by selection.— C. R. B.

MR. GEORGE MASSEE has made an exhaustive study of the genus Coprinus,[17] recognizing 165 species, 34 of which are credited to the United States and 20 of them peculiar to it. The evolution of form in the Agaricineæ is represented as proceeding from such primitive types as Marasmius, etc., in which "the pileus is sessile or stemless and fixed by its back to the substratum, the gills being uppermost and consequently entirely unprotected from the earliest stage of development." From this primitive type of structure there are three leading lines of departure: (1) turning the hymenium downwards; (2) the acquisition of a central stem; (3) the freedom of the gills from the stem. The Agaricineæ do not form a single group showing the above sequence, but are broken up into four series, each running through the lines of development indicated. These four series are characterized by the color of the spores (black, brown, pink or salmon, white), the Melanosporæ being the oldest and the Leucosporæ being the youngest. The chief biological feature of Coprinus is the deliquescence of the gills at maturity into a liquid which drips to the ground, carrying the mature spores along with it. This primitive and relatively imperfect mode of spore-dissemination, as compared with the minute, dry, wind borne spores of the other Agaricineæ, indicates that in Coprinus we have the remnant of a primitive group of fungi from which have descended the entire modern group of Agaricineæ with wind borne spores; and which can be traced back to the still more primitive subterranean fungi which are the common ancestors of the entire group of the Basidiomycetes. Evidences of the antiquity of Coprinus are seen in the world wide distribution of the genus, and the limited area occupied by species. Of the modern agarics the Melanosporæ are most closely allied to Coprinus, being directly derived from it, and, in fact, the gills of many species of Melanosporæ show a tendency to deliquesce. Attention is also called to the fact that while liquefaction of the elements of the hymenium was abandoned

[17] Ann. Bot. 10: 123–184. 1896.

at a very early stage in the evolution of the agarics, it persisted throughout the entire sequence of development in the parallel group of Gastromycetes. Among the Phalloideæ the semi-liquid product has a decided smell and sweet taste, attractive to insects; "thus the feature which proved a failure in the Agaricineæ has been an important factor in raising the Phalloideæ to their present position as head of the fungal subkingdom."—J. M. C.

PROFESSOR T. KIRK has long been a student of the New Zealand flora. Aside from the great interest which attaches to the flora itself, the influence of the presence of man is exceptionally open to study. This phase of the subject was presented recently by Mr. Kirk in a presidential address before the Wellington Philosophical Society, entitled "The displacement of species in New Zealand."[18] Many interesting ecological features of this displacement are presented, some of which deserve mention here. The destruction of the great "kauri" forests has resulted in the absolute desolation of the areas. It seems that the bushmen fired the dead branches after the logs were removed, not only destroying all young growth, but also all fallen seeds, since the soil is charged with resin and becomes intensely heated. Next to the direct operations of man the chief agents in destructive work are sheep and rabbits, whose close feeding has all but extirpated the more delicate plants over large areas. The pig and rat have proved destructive also, and a curious orchid (Gastrodia) is cited whose nutritious tubers are particularly attractive to the black rat, and which has become very rare wherever the black rat is plentiful. A small native beetle has greatly reduced many species of Compositæ by depositing eggs among the disk flowers, the larvæ from which destroy the ovary before it reaches maturity. The great increase of this insect in recent years is thought to be due to the frequent burning of the surface vegetation, thus destroying the lizards and predatory insects which kept the beetle in check. In many cases introduced plants have taken possession of sea-beaches, completely displacing the original vegetation. A most notable case of displacement is that of the New Zealand flax (*Phormium tenax*), *Cyperus ustulatus*, and the common *Pteris esculenta*, all robust plants, by European grasses and clovers. In other cases certain native grasses have succeeded in maintaining themselves associated with the foreigners, "to the great benefit of the stock-grower." Special attention is called to the invasion of three species of Epacris, all natives of New South Wales, which have been observed within the last thirty or forty years to enter New Zealand and rapidly take possession of large areas. So rapidly were they extending their area in the direction of the prevailing winds that Mr. Kirk is convinced that they "would be able practically to replace the indigenous vegetation over the entire area if not interfered with by man.'

[18] Jour. Bot. **34**: 338. 1896.

In this case there is clear evidence of the transportation of seeds by atmospheric currents over a distance of from 1200 to 1400 miles, and of their establishment in a new country. The number of naturalized species has now reached more than five hundred, and if the rate of increase of the last few years be continued for the next fifty years the naturalized and indigenous species will be about equal, a condition of things very unlikely to be reached, as favorable conditions for encroaching species must be reduced rapidly with their increase. The distribution of naturalized plants follows the same lines as that of the indigenous flora, the number rapidly decreasing southward. The Auckland district is much more favorable for the naturalization of plants from warm temperate climates than any other portion of the colony. An interesting illustration of this is given. A large quantity of ballast from Buenos Ayres was discharged at Wellington, and more than one hundred species of plants made their appearance before the close of the second summer, the great majority of which had been naturalized already in the Auckland district. Not more than two, most likely but one, of these will become naturalized on the stiff Wellington clay, while it is certain that fully one-third of them would have become established on the light scoria soil of the Auckland isthmus. Mr. Kirk draws a good distinction between displacement and replacement, and does not anticipate the absolute extermination of any large number of indigenous plants.—J. M. C.

TWO RECENT paleobotanical reports of interest are those upon the flora of the Potomac formation, by Professor L. F. Ward, and upon the Tertiary floras of the Yellowstone National Park, by Mr. F. H. Knowlton. Professor Ward discusses[19] the Potomac formation in general, and then takes up in detail the several floras into which it has been divided. These lower cretaceous floras present some striking features, aside from the ordinary lists of paleobotanical material. Certain specimens are thought to be the remains of a species of Casuarina, which has been called *C. Covillei*. The plate representing a single specimen of this plant also contains the figures of two living species of Casuarina, and the resemblance certainly is striking; but with Ephedra and other jointed and fluted fossil genera in the background, to say nothing of Equisetum and its associates, the certainty of this reference is not convincing. As the author remarks, "it would certainly be an interesting fact if it were proved that this anomalous type of vegetation lived in America during lower cretaceous time." Even if the genus did occur here, however, it is not so clear that its association with Ephedra is at all significant of an intermediate position between gymnosperms and angiosperms, or that angiosperms have been derived from gymnosperms. The most interesting of the ferns are the species of Thyrsopteris, a living genus of but a single

[19] Fifteenth annual report of the U. S. Geol. Survey, 307. 1895.

species and confined to the island of Juan Fernandez. The conifers are abundantly represented, and among them the new genus Nageiopsis, so closely resembling a cycad. Naturally, Sequoia occurs in the formation, as it seems to in cretaceous and tertiary deposits over nearly the whole globe. The dicotyledons are abundant enough, but the monocotyledons are very rare, but seven forms being referred to them doubtfully. Attention is also called to the important part played by the genus Populus in the geological history of plants. It is one of the most widespread genera of fossil plants, and seems to have developed along several distinct lines, and, "historically considered, is the most interesting of all dicotyledonous genera."

Mr. Knowlton's paper[20] is a brief preliminary statement concerning a full report which will appear later. It seems that the most remarkable fossil forest known occurs in the Yellowstone National Park, and it has yielded abundant material in excellent condition for study. The author contrasts the flora of the park today with this tertiary flora. "The dominant elements of the living flora are the abundant coniferous forests, but these involve a very meager display of species; the tertiary forests, however, were characterized by the dicotyledonous trees, such as walnuts, hickories, oaks, beeches, chestnuts, elms, magnolias, sycamores, sumacs, lindens, azalias, persimmons, and ashes. There seems to be little relation between the two floras, and they are certainly not related by descent. The tertiary flora has its affinities at the south, while the present flora is evidently of northern origin."—J. M. C.

[20] Amer. Jour. Sci. IV. **2**: 51. 1896.